Arthropoda Selecta 31(1): 1–9

Review of the Central Asian millipede genus *Elongeuma* Golovatch, 1982, with descriptions of two new species (Diplopoda: Chordeumatida: Kirkayakidae)

Обзор центральноазиатских многоножек-диплопод рода *Elongeuma* Golovatch, 1982, с описаниями двух новых видов (Diplopoda: Chordeumatida: Kirkayakidae)

Sergei I. Golovatch[1], Jörg Spelda[2]
С.И. Головач[1], Й. Шпельда[2]

[1] Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071 Russia.
[1] Институт проблем экологии и эволюции РАН, Москва 119071 Россия.
[2] Staatliche Naturwissenschaftliche Sammlungen Bayerns, Zoologische Staatssammlung (SNSB-ZSM), Münchhausenstr. 21, D-81247 München, Germany.

KEY WORDS: taxonomy, key, Tien-Shang Mountains. Kyrgyzstan, map.
КЛЮЧЕВЫЕ СЛОВА: таксономия, ключ, Тянь-Шань, Кыргызстан, карта.

ABSTRACT. The millipede genus *Elongeuma* Golovatch, 1982, is shown to currently comprise three species, all keyed, mapped, and confined to the Tien-Shang (= Tian Shan) Mts of Kyrgyzstan, Central Asia: *E. speophilum* Golovatch, 1982 (the type-species, revised), *E. reductum* sp.n., and *E. chichkan* sp.n.

How to cite this paper: Golovatch S.I., Spelda J. 2022. Review of the Central Asian millipede genus *Elongeuma* Golovatch, 1982, with descriptions of two new species (Diplopoda: Chordeumatida: Kirkayakidae) // Arthropoda Selecta. Vol.31. No.1. P.1–9. doi: 10.15298/arthsel. 31.1.01

РЕЗЮМЕ. Показано, что диплоподы рода *Elongeuma* Golovatch, 1982, ныне включают три вида, все помещенные в ключ, их ареалы картированы, и все они приурочены к Тянь-Шаню Кыргызстана: *E. speophilum* Golovatch, 1982 (типовой вид, ревизован), *E. reductum* sp.n. и *E. chichkan* sp.n.

Introduction

The small, central Palaearctic millipede family Kirkayakidae (= Altajellidae) is currently known to comprise only four genera, all monotypic: *Kirkayakus* Özdikmen, 2008 (= *Altajella* Gulička, 1972, preoccupied and thus replaced) with *K. pallidus* (Gulička, 1972), from the Altais, Siberia [Mikhaljova, Golovatch, 2001; Mikhaljova, 2004, 2017], *Teleckophoron* Gulička, 1972 with *Teleckophoron montanum* Gulička, 1972, from the Altais, the southern part of Krasnoyarsk Province, and the Republic of Khakassia, Siberia [Mikhaljova, Golovatch, 2001; Mikhaljova, 2004, 2017; Nefediev *et al*., 2021], *Tarbagataya* Golovatch et Wytwer, 2003 with *Tarbagataya splendida* Golovatch et Wytwer, 2003, from the Tarbagatay Mountains in eastern Kazakhstan, Central Asia [Golovatch, Wytwer, 2003], and *Elongeuma* Golovatch, 1982, with *E. speophilum* Golovatch, 1982, from a cave in Tien-Shang Mountains, Kyrgyzstan (= Kirghizia), Central Asia [Golovatch, 1982]. The family (as Altajellidae) has been properly circumscribed, and all of its four constituent genera and species have been keyed [Golovatch, Wytwer, 2003].

Hüseyin Özdikmen, a controversial Turkish entomologist, in special search of homonyms in Diplopoda, proposed six new generic names (two confusingly constituting objective synonyms) and a new family-group name to replace perceived junior homonyms, including *Kirkayakus* Özdikmen, 2008 and Kirkayakidae Özdikmen, 2008 to substitute the preoccupied *Altajella* Gulička, 1972 and Altajellidae Mikhaljova et Golovatch, 2001, respectively [Shelley, Golovatch, 2015].

The family Kirkayakidae belongs to the trans-Palaearctic superfamily Neoatractosomatoidea that represents by far the largest and most diverse suborder Craspedosomatidea in the entire order Chordeumatida [Minelli, 2015]. None of the species and genera of Kirkayakidae appears to be even grossly sympatric with any other member of Chordeumatida. Thus, the Tien-Shang and Djungarsky Alatau mountains in Central Asia are populated by species of only one more chordeumatidan genus, *Tianella* Attems, 1904 (extending south to the Himalayas), family Entomobielziidae, superfamily Cleidogonoidea, suborder Craspedosomatidea, whereas Siberia, including the Altai Mountains, is dominated by species and genera of the very large family Diplomaragnidae, superfamily Diplomaragnoidea, suborder Heterochordeumatidea, also supporting two species of the Siberian genus *Ghilarovia* Gulič-

ka, 1972, family Anthroleucosomatidae, superfamily Anthroleucosomatoidea, suborder Craspedosomatidea [Minelli, 2015; Mikhaljova, 2017]. Superficially, all Kirkayakidae are very easily distinguished by the subcylindrical bodies devoid of paraterga.

Like the other three genera of Kirkayakidae, the genus *Elongeuma* has hitherto been considered as monobasic, with the type-species *E. speophilum* Golovatch, 1982, described solely from the ♂ holotype originating from the Kendyn-kyry Cave, southern Tien-Shang (= Tian Shan) Mts, Kirghizia, Central Asia. Based on a number of such obvious adaptations to cavernicoly as unpigmented body teguments and ocelli, strong eye reduction, elongated antennae, tergal macrochaetae and legs, *E. speophilum* has been regarded as either troglobitic [Golovatch, 1982] or troglophilic [Turbanov *et al*., 2016].

The present paper provides descriptions of two new epigean species of *Elongeuma* collected during the 1993 Expedition to Central Asia and provisionally marked as such in its brief account [Read, Golovatch, 1994]. In addition, the description and diagnosis of *E. speophilum* are refined and corrected, based on a revision of the holotype. The species diversity of the genus is thus increased to three, and of the family to six. The genus is properly rediagnosed, all of its three constituent species being keyed, and their distributions mapped.

Material and Methods

All type and non-type material is deposited in the collection of the Zoological Museum of the Moscow State University (ZMUM). The holotype of *E. speophilum* has also been revised, this allowing for some corrections to the original description and illustrations to be introduced. The pictures were taken with a Canon EOS 5D digital camera and stacked using Zerene Stacker software. Final image processing was performed with Adobe Photoshop CC.

Permanent micropreparations were mostly mounted by the second author JSP.

Abbreviations of country names used on the map (ISO 3166-1 alpha-2 codes): CN — China; KZ — Kazakhstan; TJ — Tajikistan; UZ — Uzbekistan. In the catalogue sections per species below, D stands for the original description, R for new or old records, and M for mere mention.

Taxonomy

Elongeuma reductum sp.n.
Figs 1, 3–18, Map.

Elongeuma sp. 2 — Read, Golovatch, 1994: 61, 62 (R, M).

HOLOTYPE ♂ (ZMUM), Tien-Shang (= Tian Shan) Mts, Kyrgyzstan (= Kirghizia), Chatkal Mt. Range, Sary-Chelek Nature Reserve, near Arkit, E 71.9499º, N 41.850º, Khodzha-Ata River valley, 1,550–2,200 m a.s.l., *Juglans regia*, *Picea schrenkiana, Malus, Pyrus* etc. forests, litter, 29–31.V.1993, S.I. Golovatch leg.

PARATYPES: 1 ♂, 4 ♀♀, 5 juv. (JSP180122-007, 008, 009), same locality, together with holotype, 29–31.V.1993; 1 ♂ (JSP020694-001), 1 ♀ (JSP180120-002), Sary-Chelek Nature Reserve, E 71.9499º, N 41.850º, surroundings of Lake Sary-Chelek, *Malus* litter, 1800–1950 m a.s.l., 29–31.V.1993; 1 ♂ (JSP020694-002), 1 ♀ (anterior part of body), 1 ♀ (posterior part of body) (JSP180120-003), same locality, forests, 1500–2200 m a.s.l., 29–31.V.1993; 2 ♀♀, 3 juv., Sary-Chelek Nature Reserve, E 71º67′, N 41º51′, Khoja-Ata River valley, *Juglans*, *Picea*, *Malus* etc. forest, 1500–1800 m a.s.l., 31.V.1993, all S. Golovatch leg.; 1 ♂ (JSP180122-013), Sary-Chelek Nature Reserve,. E 71º57′, N 41º51′, below Khoja-Ata river valley, in wet flushes, 1500–1600 m a.s.l., 30.V.1993, H. Read leg., 1 ♀, 2 juv., Sary-Chelek Nature Reserve, E 71º57′, N 41º51′, Meteorological Station, *Juglans* & *Malus* forest, 1500 m a.s.l., 31.V.1993, H. Read leg.; 2 ♂♂, 1 ♀ subad., 1 ♂, 4 ♀♀, 4 ♂ juv., 4 ♀ juv. (JSP180122-006, JSP120793-004, JSP070794-001), Sary-Chelek Nature Reserve, E 71.9499º, N 41.85º, head of Lake Sary-Chelek, litter in *Abies* forest on slope, 22.IX.1983, A.B. Ryvkin leg.; 1 ♀, 1 ♂ juv., 1 ♀ juv. (JSP180122-002, 003, -004), Sary-Chelek Nature Reserve, edges of Lake Sary-Chelek, *Picea* litter, 1950 m a.s.l., 22.IX.1993, H. Read leg.; 2 ♂♂, 1 ♀ juv. (JSP180122-010, 011, 012), Sary-Chelek Nature Reserve, E 71.9499º, N 41.85º, 1500–1600 m a.s.l., 27–31.V.1993, W. Schawaller leg.

NAME. To emphasize the particularly strongly reduced posterior gonopods.

DIAGNOSIS. Differs from congeners by the particularly strongly reduced posterior gonopods usually lacking any traces of coxal sacs (Figs 7, 10, 15–17), and by the structure of ♂ leg-pair 7 (Figs 3, 9) (see also key below).

DESCRIPTION. Length of adults 8–9 (♂) or 9–11 mm (♀), width 0.8–0.9 (♂) or 1.0–1.1 mm (♀). Holotype ca 8 mm long and 0.8 mm wide. Coloration of adults and subadults yellowish to brown, often apparently faded due to long preservation in ethanol (Fig. 1), sometimes with marbled, brown to blackish spots dorsally and on sides of prozonae, divided by a pale axial line and paler patches laterally and ventrolaterally. Metazonae almost entirely pale yellowish to brown, only sometimes with somewhat darker, marbled knobs supporting macrochaetae. Antennae brown to dark brown throughout, except for a pallid tip. Head especially dark on vertex, distinctly marbled. Venter yellowish. Legs pale to brown, increasingly darker toward distal podomeres.

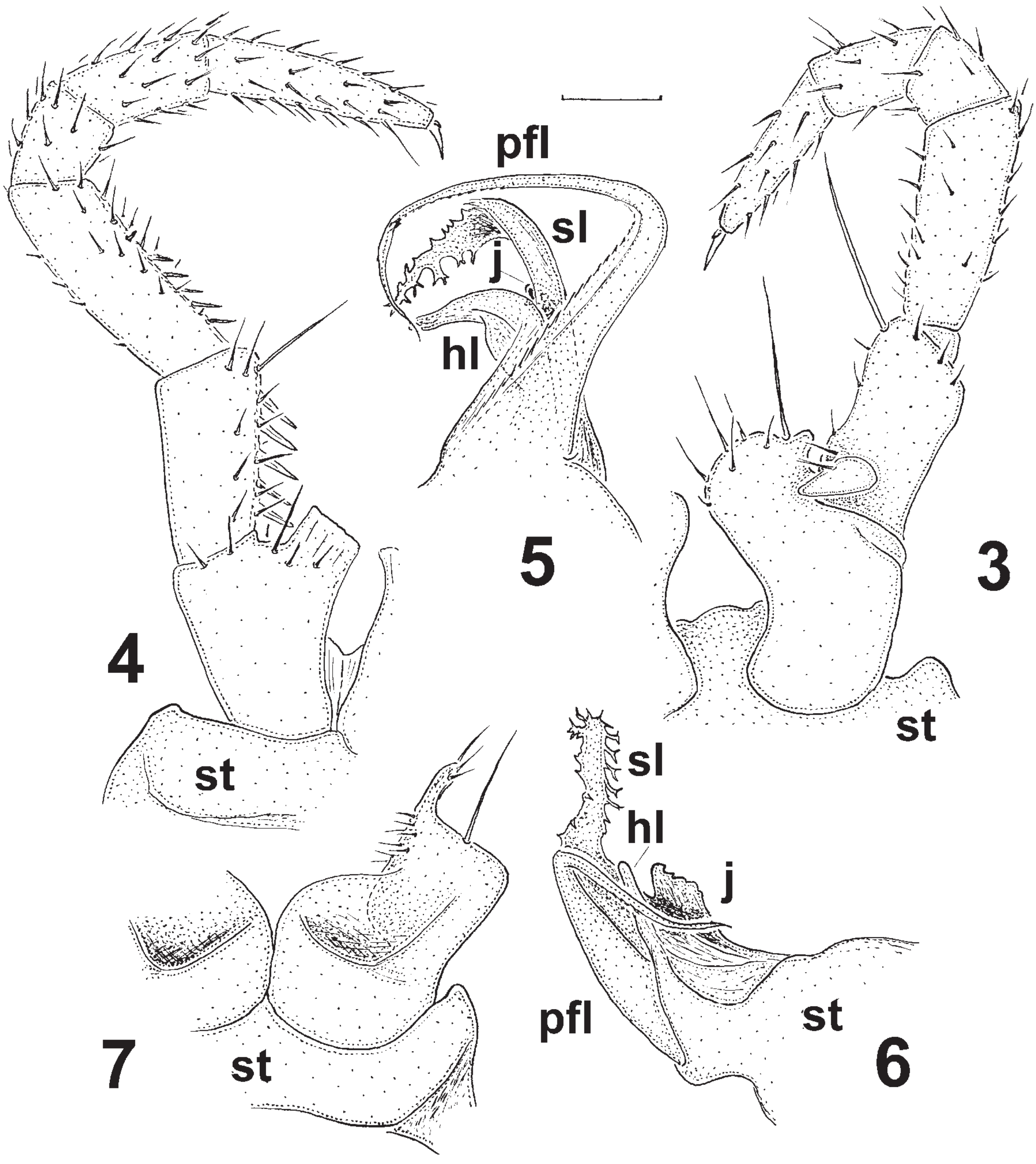
Body with 28 segments, including telson (26p+1a+T), subcylindrical, without evident lateral swellings, let alone keels, on metazonae (Fig. 1), somewhat more slender in ♂ compared to ♀. Antennae long and slender, *in situ* reaching past segment 4 or 5 when stretched laterally, antennomere 3 being the longest. Frons flattened (♂) or regularly convex (♀). Eyes black, 16–18 ocelli in a roundly triangular field from each side of head. In width, collum < head = segment 2 = 3 < 4–22(23), gently and regularly tapering thereafter. Only two or three postcollum segments with poorly-developed, rounded, lateral swellings instead of paraterga. Metatergal macrochaetae borne on minute knobs, arranged in an almost transverse row, either medium-sized, pointed and thin on two or three anteriormost segments or increasingly thick, short, blunt and subbacilliform thereafter towards telson; lateral macrochaetae longest, reaching in length ca 1/4 metatergal width (Figs 1, 8).

Legs long and slender, a little shorter in ♀, with accessory claws, but only ♂ tarsi 3–6(7) sometimes with ventral papillae (Fig. 9), mostly apapillate (Figs 3, 4). Pairs 1 and 2 distinctly reduced in size as usual, ♂ pairs 3–7 almost normal, only slightly enlarged due to coxites; ♂ leg 7 (Figs 3, 9) with a peculiar distoventral swelling on coxa and a smaller caudoparabasal cone on prefemur; ♂ pairs 10 and 11 each with coxal glands (Fig. 4), like a number of following pairs each with a ventral row of strong and spiniform setae on both femur and, especially, prefemur (Fig. 4); each ♀ coxa 2 with a strong, ventral, distally rounded, digitiform process forming a medially subcontiguous pair.



Figs 1, 2. Habitus of *Elongeuma reductum* sp.n., ♂ paratype, and *Elongeuma chichkan* sp.n., ♀ paratype, lateral views. Photographs by K.V. Makarov, taken not to scale

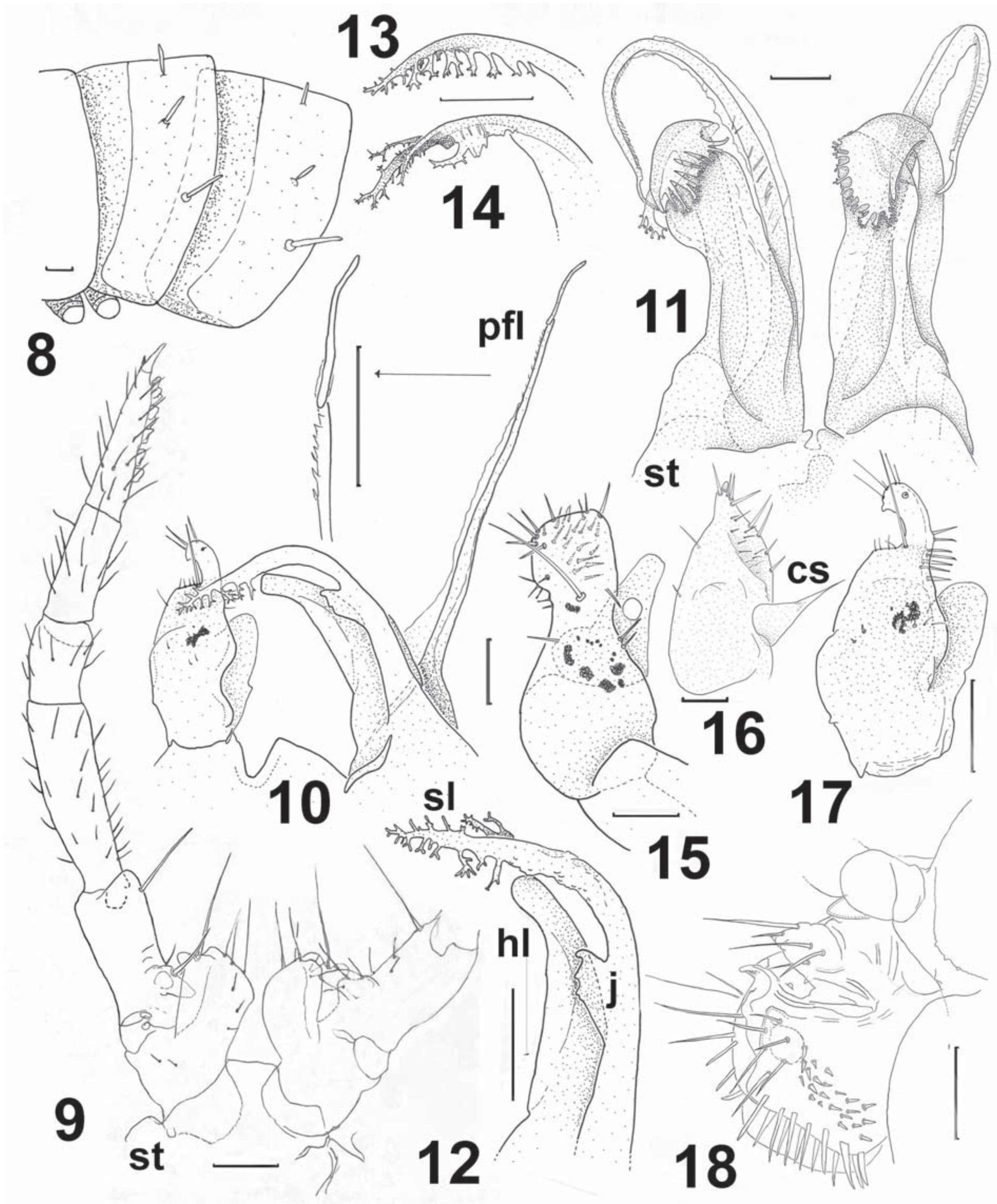
Рис. 1, 2. Общий вид *Elongeuma reductum* sp.n., паратип ♂, и *Elongeuma chichkan* sp.n., паратип ♀, виды сбоку. Фотографии К.В. Макарова, сняты без масштаба.



Figs 3–7. *Elongeuma reductum* sp.n., ♂ paratype: 3 — legs 7, anterior view; 4 — legs 10, posterior view; 5 — right anterior gonopod, mesal view; 6 — left anterior gonopod, subcaudal view; 7 — posterior gonopods, caudal view. Abbreviations: hl — hyaline lobe; j — lateral lobule; pfl — pseudoflagellum; sl — solenomere; st — sternum. Scale bar: 0.1 mm.

Рис. 3–7. *Elongeuma reductum* sp.n., паратип ♂: 3 — ноги 7, спереди; 4 — ноги 10, сзади; 5 — правый передний гонопод, изнутри; 6 — левый передний гонопод, примерно сзади; 7 — задние гоноподы, сзади. Обозначения: hl — гиалиновая пластина; j — боковая пластинка; pfl — ложный жгутик; sl — соленомер; st — стернит. Масштаб: 0,1 мм.

Anterior gonopods (Figs 5, 6, 10–14) placed on an evident plate-like sternum (**st**) with lateral tracheal apodemes, high, held parallel to each other, fully independent, curved caudally, clearly tripartite: each composed of a lateral, relatively short, blunt to subacuminate, hyaline lamella (**hl**), *vs* slender and finger-shaped in *E. reductum* sp.n., semi-circular with a basal constriction in *E. chichkan* sp.n., and linguiform and blunt in *E. speophilum*; more mesally a longer, conspicuously divided solenomere (**sl**) carrying a small, midway, caudal lobule (**j**) and a barbed/fringed distal quarter; and a very long pseudoflagellum (**pfl**), slightly serrate or undulate at caudal margin. Posterior gonopods (Fig. 7, 10, 15–17) particularly simple, mostly composed of medially contiguous, elongated coxites, both somewhat excavate on caudal face, usually produced apically into a small and setose appendage (telopodite remnant) of varying shapes (Figs 15–17), often showing traces of a dark pigment inside, and only occasionally with dis-



Figs 8–18. *Elongeuma reductum* sp.n., ♂ paratypes (8–17) and ♀ paratype (18): 8 — body rings 7 and 8, lateral view; 9 — legs 7, anterior view; 10 — both right gonopods, mesal view; 11 — both anterior gonopods, posterior view; 12 — distal part of anterior gonopod (without pseudoflagellum), mesal view; 13, 14 — variations in solenomere's distal structure, mesal views; 15–17 — variations in posterior gonopod structure; 18 — vulva, lateral view. Abbreviations: cs — coxal sac vestige; hl — hyaline lobe; j — lateral lobule; pfl — pseudoflagellum; sl — solenomere; st — sternum;. Scale bars: 0.1 mm.

Рис. 8–18. *Elongeuma reductum* sp.n., паратипы ♂♂ (8–17) и ♀ (18): 8 — сегменты тела 7 и 8, сбоку; 9 — ноги 7, спереди; 10 — оба правых гонопода, изнутри; 11 — оба передних гонопода, сзади; 12 — дистальная часть переднего гонопода (без ложного жгутика), изнутри; 13, 14 — изменчивость в дистальной орнаментации соленомера, изнутри; 15–17 — изменчивость в структуре заднего гонопода; 18 — вульва, сбоку. Обозначения: hl — гиалиновая пластина; j — боковая пластинка; pfl — ложный жгутик; sl — соленомер; st — стернит; cs — остаток коксального кармана. Масштаб: 0,1 мм.



Map. Distribution of *Elongeuma* species: white circle — *E. chichkan* sp.n.; white square — *E. reductum* sp.n.; white triangle — *E. speophilum* sp.n.

Карта. Распространение видов рода *Elongeuma* species: белый кружок — *E. chichkan* sp.n.; белый квадрат — *E. reductum* sp.n.; белый треугольник — *E. speophilum* sp.n.

cernible coxal pouches or sacs (**cs**) with small projections medially.

Vulva with a characteristic beak-shaped caudolateral structure behind operculum (Fig. 18).

Elongeuma chichkan sp.n.
Figs 2, 19–23, Map.

Elongeuma sp. 3 — Read, Golovatch, 1994: 61, 62 (R, M).

HOLOTYPE ♂ (+ micropreparation) (ZMUM), Tien-Shang (= Tian Shan) Mts, Kyrgyzstan (= Kirghizia), Suusamyr Too Mt. Range, Chichkan River valley S of Alabel Pass, 1,700 m a.s.l., *Betula* & *Juniperus* forest, 2.VI.1993, S.I. Golovatch leg.

PARATYPES: 3 ♀♀, 1 ♂ juv., 1 ♀ juv (JSP180121-007, 008, 009, 010, 011), same locality and date, leg. S.I. Golovatch.

NAME. Named after the type locality, Chichkan River, meaning "a small mouse" in the Kirghiz language.

DIAGNOSIS. Differs from congeners by the particularly strongly reduced posterior gonopods usually lacking any traces of a telopodite, and by the structure of ♂ leg-pair 7 (see also key below).

DESCRIPTION. Length ca 9 (♂ holotype) or 9–10 mm (♀ paratypes), width 0.85 (♂ holotype) or 0.9–1.0 mm (♀ paratypes).

All characters as in *E. reductum* sp.n., except as follows.

Coloration more regular, less contrasting/vivid (Fig. 2). ♂ leg-pairs 3–6 more distinctly enlarged, with tarsal papillae distally; ♂ legs 7 (Fig. 19) with greatly enlarged coxites each carrying a caudoparabasal knob and a strongly reduced, 2-segmented telopodite directed dorsolaterad, devoid of tarsal papillae; several pairs behind gonopods (Fig. 20) likewise with a ventral row of strong and spiniform setae on both femur and, especially, prefemur.

Anterior gonopods (Figs 21, 22) much like in *E. reductum* sp.n., *vs* **hl** being slender and finger-shaped in *E. reductum* sp.n., semi-circular with a basal constriction in *E. chichkan* sp.n., and linguiform and blunt in *E. speophilum*, also differing in the absence of a lobule (**j**) on each solenomere (**sl**). Posterior gonopods (Fig. 23) much more like in *E. speophilum*, coxites quite high, densely setose, caudoparabasal excavation very deep, each with a coxal pouch or sac (**cs**) with a strong coniform projection medially.

Operculum of vulva with a similar, but stronger beak-shaped structure behind operculum, this structure being directed caudad, not caudolaterad (Fig. 2).

Elongeuma speophilum Golovatch, 1982
Figs 24–31, Map.

Elongeuma speophilum Golovatch, 1982: 944 (D).

Elongeuma speophilum — Read, Golovatch, 1994: 64 (M); Turbanov et al., 2016: 1291 (M).

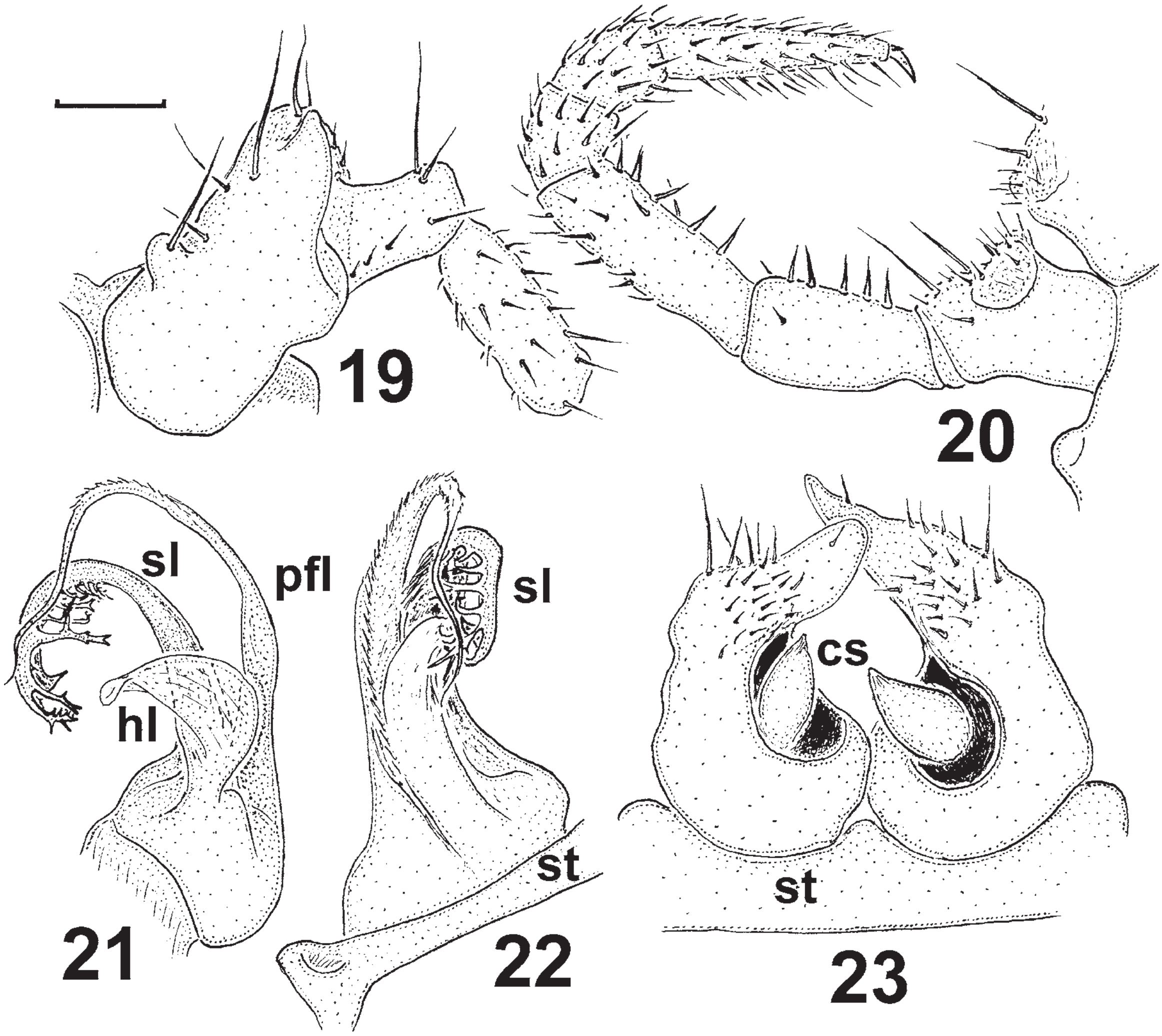
HOLOTYPE ♂ (ZMUM ρ1530), revised, Tien-Shang (= Tian Shan) Mts, Kyrgyzstan (= Kirghizia), Fergana Mt. Range, Kirgyzindan River valley, Kendyn-kyry (= Kyndyn-kyry, or Zindan) Cave, 100–120 m inside (off entrance), X.1978, V. Ogudin leg. (https://speleo.kg/expeditions/2021/alternativnyj-karstovyj-rajon-v-doline-reki-kuraves/).

DIAGNOSIS. Differs from congeners by a pallid coloration with only five light brown ocelli on each side of the head. ♂ legs 7 are with a pair of strong hooks on the coxae and small glandular parabasal knobs on the prefemora (Fig. 26). Coxal pouches (**cs**) of the posterior gonopods are membranous (see also key below).

BRIEF REDESCRIPTON. Length ca 14 mm, width 1.1 mm on mandibular genae, 1.0 mm on midbody segments (♂).

All characters as in *E. reductum* sp.n., except as follows.

Coloration pallid, only 5 ocelli on each side of head light brown. Body with 28 segments. Antennae longer, reaching segment 6 when stretched laterally, antennomere 3 being the longest. Metatergal macrochaetae mostly bacilliform and blunt (Fig. 24). ♂ leg-pairs 3–6 only slightly enlarged, with tarsal papillae distally; each ♂ leg 7 (Fig. 26) with a laterally micropapillate coxa carrying a strong ventral hook directed distad, while prefemur with a small, glandular, parabasal knob ventrally; ♂ legs 10 and 11 with coxal sacs/glands (Figs 27, 28), usual, devoid of tarsal papillae like following legs.



Figs 19–23. *Elongeuma chichkan* sp.n., ♂ holotype: 19 — legs 7, posterior view; 20 — legs 10, posterior view; 21, 22 — right anterior gonopod, mesal and posterior views, respectively; 23 — posterior gonopods, posterior view. Abbreviations: cs — coxal sac vestige; hl — hyaline lobe; pfl — pseudoflagellum; sl — solenomere; st — sternum. Scale bar: 0.1 mm.

Рис. 19–23. *Elongeuma chichkan* sp.n., голотип ♂: 19 — ноги 7, сзади; 20 — ноги 10, сзади; 21, 22 — правый передний гонопод, соответственно изнутри и сзади; 23 — задние гоноподы, сзади. Обозначения: cs — остатки коксального кармана; hl — гиалиновая пластина; pfl — ложный жгутик; sl — соленомер; st — стернит;. Масштаб: 0,1 мм.

Anterior gonopods (Figs 29, 30) much like in *E. reductum* sp.n., but differing in the absence of a lobule (**j**) on each solenomere (**sl**), thus being very similar to those of *E. chichkan* sp.n.. Posterior gonopods (Fig. 31) also very similar to those in *E. chichkan* sp.n., both coxites being quite high, sac-shaped and densely setose, while coxal pouches or sacs (**cs**) with membranous projections.

REMARK. This species was observed living on ice inside the cave at an elevation of >2000 m a.s.l. (https://speleo.kg/expeditions/2021/alternativnyj-karstovyj-rajon-v-doline-reki-kuraves/).

Key to species of *Elongeuma*

1(2) Larger: length of adults ca 14 mm. Coloration pallid, only 5 light brown ocelli on each side of head. ♂ legs 7 with a pair of strong hooks on coxae and small glandular parabasal knobs of prefemora (Fig. 26). Coxal pouches (**cs**) of posterior gonopods with membranous projections (Fig. 31) .... *E. speophilum*

2(1) Smaller: adults up to 10 mm long. Coloration usually yellow-brown, adults and subadults often with distinct patterns. Up to 16–18 ocelli black. ♂ legs 7 otherwise. Coxal pouches (**cs**) of posterior gonopods either totally suppressed or with small and coniform projections 3

3(4) ♂ legs 7 leg-like, as in Figs 3 and 9. Solenomere (**sl**) of anterior gonopods (Figs 5, 6, 10, 12) with a distinct midway lobule (**j**). Posterior gonopods particularly strongly reduced (Fig. 5), usually without coxal pouch vestige .... *E. reductum* sp.n.

3(4) ♂ legs 7 with strongly reduced, 2-segmented telopodites (Fig. 19). Solenomere (**sl**) of anterior gonopods (Figs 21, 22) without lobule **j**. Coxal pouches (**cs**) of posterior gonopods with distinct and coniform projections (Fig. 23) .... *E. chichkan* sp.n.

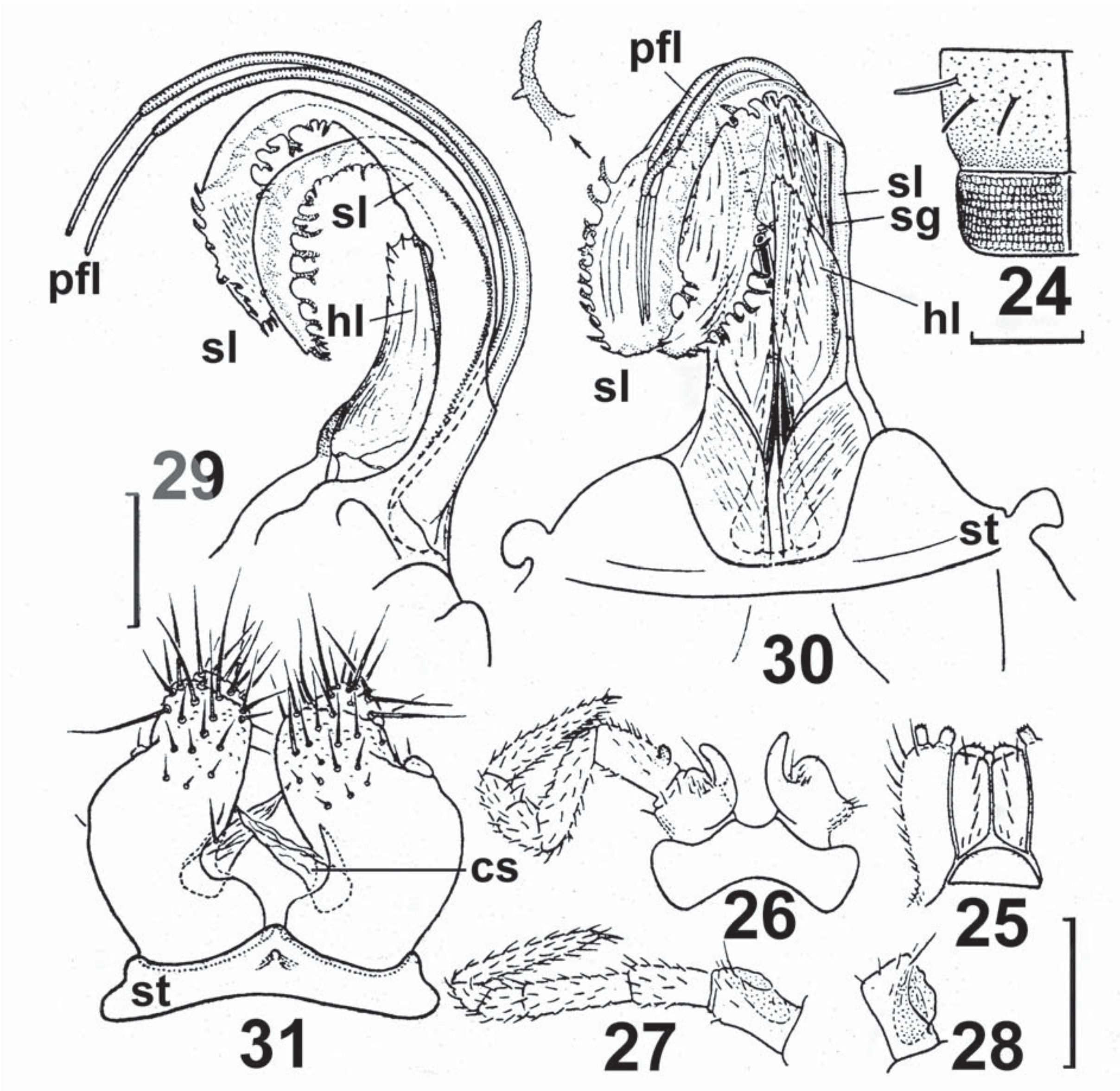


Fig. 24–31. *Elongeuma speophilum* Golovatch, 1982, ♂ holotype: 24 — left half of midbody ring, dorsal view; 25 — gnathochilarium, ventral view; 26 — legs 7, posterior view; 27 — leg 10, posterior view; 28 — coxa 11, posterior view; 29, 30 — anterior gonopods, lateral and posterior views, respectively; 31 — posterior gonopods, anterior view. Abbreviations: cs — coxal sac vestige; hl — hyaline lobe; pfl — pseudoflagellum; sg — seminal groove; sl — solenomere; st — sternum. Scale bars: 0.5 mm (24, 29–31) and 0.2 mm (25–28). After Golovatch [1982].

Рис. 24–31. *Elongeuma speophilum* Golovatch, 1982, голотип ♂: 24 — левая половина среднетуловищного сегмента, сверху; 25 — гнатохилярий, снизу; 26 — ноги 7, сзади; 27 — нога 10, сзади; 28 — тазик 11, сзади; 29, 30 — передние гоноподы, соответственно сбоку и сзади; 31 — задние гоноподы, спереди. Обозначения: cs — остаток коксального кармана; hl — гиалиновая пластина; pfl — ложный жгутик; sg — семенной канал; sl — соленомер; st — стернит. Масштаб: 0,5 мм (24, 29–31) и 0,2 мм (25–28). По: Головач [1982].

Further notes on and a new diagnosis of *Elongeuma*

As the genus *Elongeuma* presently comprises already three described species, an analysis of intrageneric variations is possible. Because the original description of the type species *E. speophilum* (ZMUM, holotype restudied, see above) and illustrations [Golovatch, 1982] erred in several accounts (28, not 30, body segments, largely blunt metatergal macrochaetae, ♂ legs 7 mistakenly referred to and depicted as legs 6 etc.), most of which were corrected later [Golovatch, Wytwer, 2003], a fully rectified redescription has been given below.

The most pronounced variations in *Elongeuma* spp. seem to concern ♂ leg-pair 7 and the posterior gonopods. Indeed, whereas ♂ legs 7 are eventually leg-like in *E. speophilum* and *E. reductum* sp.n., with modifications mainly affecting the coxa, it is surprisingly strongly reduced in *E. chichkan* sp.n. (Fig. 19). In *E. reductum* sp.n., particularly strong

reduction concerns the posterior gonopods, with the coxite not being hypertrophied, and the coxal pouch vestige usually being totally missing (Figs 7, 10, 15–17).

Traditionally, the presence or absence of ♂ tarsal papillae has been considered as a family-rank character (e.g. Attems [1926], Verhoeff [1926–1932] or Minelli [2015]). Tarsal papillae present in *Elongeuma* spp. only in ♂ legs 3–6(7), these often being restricted to the distalmost parts of the tarsi, is rather unusual as compared to the remaining three genera and species of Kirkayakidae (cf. Golovatch, Wytwer [2003]).

Genus *Elongeuma* Golovatch, 1982

Type species: *Elongeuma speophilum* Golovatch, 1982, by original designation.

DIAGNOSIS. Body small (adults 8–14 mm long), with 28 segments (26p+1a+T), juloid, devoid of paraterga. Clypeus flattened (♂) or regularly convex (♀). Metatergal macrochaetae mostly bacilliform. Gnathochilarium without promentum. Collum usual, not covering the head from above. Tegument smooth.

Legs long and slender, ♀ legs 2 normal; only ♂ legs 3–6(7) with tarsal papillae, ♂ legs 7 modified; both ♂ legs 10 and 11 with coxal sacs.

Anterior gonopods placed on a plate-like sternum with retained tracheal apodemes; coxites always independent, contiguous medially, clearly curved caudad, held parallel to each other to slightly crossing each other distally, tripartite: each composed of a pair of lateral hyaline lamellae (**hl**); more mesally with a pair of longer, conspicuously divided solenomeres (**sl**), each conspicuously barbed/fringed distally; and a pair of mesal, very long pseudoflagella (**pfl**) (or true flagella as derivatives of coxal glands?). Posterior gonopods far more simple, also placed on a plate-like sternum with retained tracheal apodemes, mostly composed of medially contiguous, elongated, sac-shaped and setose coxites either fully devoid of coxal pouches or retaining their vestiges (**cs**) medially near base.

Conclusion

This study has long been nearly accomplished, but remained shelved for nearly three decades in the hope for additional samples to come in. However, at present it appears best to publish it as it stands, however incomplete, because the collecting activities for Diplopoda in the Tien-Shang Mountains seem to have lately come to naught. At the moment, the known species seem to be confined to the western parts of Tien-Shang (Map), whereas the central and eastern parts seem to support only species of *Tianella*, the sole other chordeumatidan genus encountered in Central Asia. Allopatry seems to prevail between species or is manifest in both genera of Chordeumatida in the region. Thus, Sary-Chelek appears to support not only *Elongeuma reductum* sp.n., but also another kirkayakid, possibly an *Elongeuma* species, represented by two females, both distinctly larger than *E. reductum* sp.n. Yet, in the absence of male material it is impossible to describe them as something new.

Indeed, given the huge size and orographic diversity of the region, more *Elongeuma* species may well be expected to occur in the Tien-Shang Mountains. The above key is meant to facilitate future descriptions.

Acknowledgements. We wish to acknowledge the help of all collectors who donated us their material: Helen Read (Burnham Beeches, UK), Aleksandr B. Ryvkin (Moscow, Russia), and Wolfgang Schawaller (Stuttgart, Germany). In addition, special thanks are due to all participants of the 1993 Expedition to Central Asia [Read, Golovatch, 1994]: Selvin D. Dashdamirov (then Baku, Azerbaijan), Dmitry A. Milko, Sergei A. Ovtchinnikov, Sergei L. Zonstein (then all Bishkek, Kyrgyzstan), Helen Read, Paul Read (Thrundeston, UK), Wolfgang Schawaller, Jochen Martens (Mainz, Germany), Oleg G. Gorbunov (Moscow, Russia), and Crista Deeleman-Reinhold (Ostendrecht, The Netherlands). Special thanks go to Arkady Schileyko (ZMUM) for the loan of the *Elongeuma speophilum* holotype under his care, Julia and Pavel Nefediev (both Barnaul, Russia) kindly helped us execute the map, while Kirill Makarov (Moscow, Russia) very skillfully took both photographs used in this paper.

References

Attems C. 1926. Myriopoden // Kükenthal W. & Krumbach T. (Hrsg.), Handbuch der Zoologie. Bd.4. 402 S.

Golovatch S.I. 1982. [A new genus of millipedes (Diplopoda, Chordeumida) from Middle Asia] // Zoologicheskii zhurnal. Vol.61. No.6. P.943–945 [in Russian, a summary in English].

Golovatch S.I., Wytwer J. 2003. A new genus and species of the millipede family Altajellidae from eastern Kazakhstan, Central Asia (Diplopoda: Chordeumatida) // Annales Zoologici. Vol.53. No.3. P.579–584.

Mikhaljova E.V. 2004. The Millipedes (Diplopoda) of the Asian Part of Russia. Sofia – Moscow: Pensoft, 292 p.

Mikhaljova E.V. 2017. [The millipede fauna (Diplopoda) of the Asian part of Russia]. Vladivostok: Dalnauka, 336 p. [in Russian, a summary in English].

Mikhaljova E.V., Golovatch S.I. 2001 (for 2000). A review of the millipede fauna of Siberia (Diplopoda) // Arthropoda Selecta. Vol.9. No.2. P.103–118.

Minelli A. (ed.). 2015. The Myriapoda. Volume 2 // Treatise on Zoology – Anatomy, Taxonomy, Biology. Brill: Leiden & Boston, 482 p.

Nefediev P.S., Nefedieva J.S., Farzalieva G.S. 2021. New data on the myriapod fauna (Myriapoda: Chilopoda, Diplopoda) of the Republic of Khakassia, central Siberia, Russia // Invertebrate Zoology. Vol.18. No.1. P.36–46.

Shelley R.M., Golovatch S.I. 2015. Nomenclator Generum et Familiarum Diplopodorum III. A list of the Genus-, Family-, and Ordinal-Group names proposed in the Class Diplopoda from 1 January 2000 – 31 December 2014 // Arthropoda Selecta. Vol.24. No.1. P.1–26.

Read H.J., Golovatch S.I. 1994. A review of the Central Asian millipede fauna // Bulletin of the British Myriapod Group. No.10. P.59–70.

Turbanov I.S., Palatov D.M., Golovatch S.I. 2016. [The state of the art of biospeleology in Russia and other countries of the former Soviet Union: A review of cave (endogean) invertebrate fauna. 2. Arachnida – Acknowledgements] // Zoologicheskii zhurnal. Vol.95. No.11. P.1283–1304 [in Russian; English translation: Entomological Review. Vol.96. No.9. P.1297–1333].

Verhoeff K.W. 1926–1932. Diplopoda // Dr. H.G. Bronns Klassen und Ordnungen des Tier-Reichs wissenschaftlich dargestellt in Wort und Bild. Bd.5. 2083 S.

Responsible editor K.G. Mikhailov